Adaptation of quantitative research instrument to Australian nursing practice environment

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Abstract
Adaptation of quantitative research instruments is becoming a familiar practice as researchers aim for wider outcome, applying an instrument in different contexts. These adaptations meet requirements of different contexts, & could change the original instrument’s language, content & structure. As instruments are adapted, confusions arise as to how much adaptation is needed & how such adaptation affects the instrument’s validity. Within the context of nursing practice environment in New South Wales hospitals, the paper explains adaptation process of the American Practice Environment Scale-Nursing work Index (PES-NWI) instrument along with relevant validity impacts. The gap to address here is the discussion of validity of the adapted PES-NWI instrument that could be a guide for research method of future work.

Keywords: measurement methods, instrument validation, quantitative methods, survey methods

The term “adaptation of quantitative research instrument” is used by authors in this paper to refer to the process of modifying or changing an existing quantitative instrument to meet the requirements of a new context. While there is no formal definition of this process, application of adapted quantitative research instruments are becoming frequent for efficient and wider research outcome. Researchers encourage reevaluating an adapted instrument for its utility and acceptability through reports of its adaptation process, and validity characteristics (Dawis, 1987, Frost, Reeve, Liepa, Stauffer & Hays 2007). The authors of this paper aim to communicate adaptation process of an American nursing practice environment measurement instrument (Practice Environment Scale-Nursing work Index; PES-NWI) to the Australian context. The adaptation process along with its validity implication that is discussed here could guide future researchers towards better research outcome in their application of PES-NWI in Australia.

Literature on Australian healthcare puts clear emphasis on the need for a healthy practice environment for Australian nurses (Cowin & Jacobsson 2003, Hogan, Moxham & Dwyer 2007). Efforts to improve nursing practice environment is a matter of priority, specially as 75% of Australian nurses claimed their work environment is not a positive one (Australian Nursing Federation, August 2007). A reliable nursing practice environment instrument will allow researchers to recommend relevant and meaningful ways to improve the situation. Reflecting on this need, this paper discusses the adaptation process of “Practice Environment Scale-Nursing Work Index (PES-NWI)”, an instrument that measures nursing practice environment for its ability to facilitate quality nursing care and nurses’ job satisfaction (Lake, 2002).

PES-NWI stands out from other nursing practice environment measurement tools for its wider application by researchers
in countries like USA (Lake, 2007, Siu, Lashinger, Finegan 2008), Canada (Lee, Lake & Aiken 2009), China (Hui-Ying Chiang and Lin, 2009). Study of nursing practice environment through PES-NWI is valuable to Australian hospitals as it can bring in quality nursing care and higher retention of nurses that either directly or indirectly rewards patients, nurses and the hospital management. In fact, there are two small scale researches that have found the instrument useful and applied it to the context of Australian hospitals (Joyce and Crookes, 2007, Middleton, Griffith, Fernandez & Smith 2008). However, the concern is that while some adaptations to the PES-NWI were suggested by these authors to match the Australian context, there was not enough clarification regarding the adaptation process and validity of the adapted instrument. For example, till to date none of the papers disclosed construct validity of the adapted instrument that is whether the instrument provides right interpretation of different constructs of Australian nursing practice environment. It is hoped that this paper would initiate interest to fill in this gap.

It should be mentioned that validity in this paper is built around its general definition: whether the test is measuring what it is supposed to measure (Garrett, 1937). However, authors of this paper intended to approach validity not only from statistical sense but also from practical sense; where validity is similar to its dictionary definition of being relevant and meaningful (Merriam-Webster, 2009).

1. ADAPTATION PROCESS

Purpose of this process was to assess the PES-NWI instrument’s suitability to the new context for the three factors of language, content and structure (Dawis, 1987, Snyder, Watson, Jackson, Cella & Halyard 2007). The language assesses whether items in the instrument had words that are in use in Australian context. The content assesses whether the theme of the instrument are relevant to the Australian registered nurses. Structure assesses respondents’ comfort with structural matters of the instrument (i.e. number of scale points in response items, the length of the instrument). Adaptations made to the PESNWI instrument in this paper were guided by three steps; I) Review of Applications of PES-NWI II) Peer Review and III) Pilot Study. An overview of the adaptation process is depicted in Diagram 1:
1.1 Review of Applications of PES-NWI:
Aim of this step was to learn the adaptations of previous research that applied PES-NWI instrument in Australian nursing practice environment. A search was conducted in electronic databases (i.e. Science Direct, Emerald Publishing, Scopus, ProQuest and Google Scholar) with the keywords such as PES-NWI, nursing practice environment in Australian hospitals. Scores of papers on Australian nursing practice environment were found, but only two of those had availed the PES-NWI instrument. Joyce and Crookes (2007) were the first to apply PES-NWI to measure nursing practice environment status of three hospitals in New South Wales. The second paper of Middleton et al. (2008) studied the nursing practice environment of one metropolitan hospital in Sydney through PES-NWI. Both of these papers did some language and content adaptations to the original PES-NWI instrument and claimed that the adapted instrument is suitable for Australian context. Joyce & Crookes (2007) also reported a satisfactory reliability score for the adapted instrument (i.e. Cronbach Alpha Value of 0.7 or higher for all the five constructs of the adapted PES-NWI). It should be mentioned that these two research projects were of small scale and were not expected to have a comprehensive approach towards adaptation of PES-NWI. However, the authors found the adaptation recommendations of these two papers very useful and incorporated most of
them in this paper. The following section explains the specific adaptations that were considered at this step:

1.1.1: Language adaptations

Ambiguity in language or wording can jeopardise an instrument’s capability to communicate the desired meaning to respondents and could threat content and construct validity (Cook and Beckman, 2006). It was very important to have the right Australian idioms in order to stay away from such ambiguity. The PESNWI were adapted with the following language changes as suggested by the above mentioned papers to have appropriate Australian words and convey the intended meaning:

- Changing the term physician to doctors (Joyce et al, 2007). They mentioned receiving confirmation from a focus group that this language change helped to convey intended meaning.
- Changing nursing job titles from i) supervisory staff to nursing unit manager ii) supervisors to senior nurses iii) nurse manager to nursing unit manager iv) nursing administrators to nurse managers v) chief nurse officer to director of nursing vi) administration to hospital management and vii) staff nurse to nurse (Middleton et al. 2008)

1.1.2: Content adaptations

Content of a research instrument should be generated from themes of theoretical relevance and supported by empirical experience (Cook and Beckman, 2006). The work of previous Australian researchers and other nursing practice environment instrument were studied to collect theoretical and empirical relevance from the perspective of Australian work environment. Sandy Middleton et al (2008) had removed an item (e.g. Use of nursing diagnosis) from the original PES-NWI. These authors found that Australian nurses felt that they do not do diagnosis at hospitals and it is not part of their jobs. Therefore the content of this item was proposed to be an irrelevant content to the Australian nursing practice environment. Considering that Middleton et al.’s (2008) work was based on only one hospital, it was decided that the proposed removal of the item should be further checked with practicing nurses. Therefore, the removal of the item (Use of nursing diagnosis) was not done at this stage.

While assessing the PES-NWI instrument’s content for its currency in the Australian context, it was compared with the other nursing practice environment instrument of Essentials of Magnetism (EOM) (Kramer and Schmalenberg, 2004a).
EOM also measures nursing practice environment for its facilitating role towards nurses’ job satisfaction and quality nursing care, however it is not as widely accepted as PES-NWI. Authors of this paper borrowed some items from EOM as this instrument covered the theme of Cultural Values and Nurse Unit Manager’s support with better clarity. The PES-NWI did not have any individual component to capture the cultural aspect of a nursing practice environment. We could not ignore the theme of cultural values from our study as it is being identified as priority area to develop in Australian hospitals (Garling, 2008). Similarly the Nurse Unit manager’s support component of EOM focuses on support that nurses receive for education, clinical autonomous practice and resource management. These issues are missing in PES-NWI, and again these are not matters to ignore as Australian nursing practice environment have been reported to face challenges related to these matters (Duffield and Franks, 2001, Duffield, Roche, O’Brien-Pallas, Catling-Paul & King 2009). Therefore the content of PES-NWI could be enriched if the full domain of “Cultural Values” and partial domain of “Nurse Unit Manager’s Support” of EOM are added to it. The content adaptations that were done to the PES-NWI instrument at this stage are:

- Addition of domain of “Cultural Values” from EOM that has 12 items. This domain measures values and norms that nurse’s share in a nursing practice environment and checks presence of three cultural processes, e.g. Updating values, establishing values /norms, transmitting values (Kramer and Schmalenberg, 2004c). This domain had a high reliability with a Cronbach Alpha score of 0.9 (Schmalenberg and Kramer, 2008).

- Addition of 5 items from “Nurse Manager Support” domain of EOM (Kramer and Schmalenberg, 2004b). These items provided specific focus on nurse unit manager’s support for nurses’ participation in education and autonomous clinical practice. Also some of the leadership criteria like facilitating team-work, resource management are better captured in these items. Therefore, these 5 items are complementing the Nurse Manager Ability domain of PES-NWI.
1.1.3: Structure Adaptations

The two Australian papers had the same structure as that of the original PES-NWI (i.e. Likert items on one to four scale points with no response option for neutral opinion). It was found that some papers (Friese, Lake, Aiken, Siber & Sochalski 2008, Hui-Ying Chiang and Lin, 2009) applying the instrument had received responses with mean scores close to neutral points (e.g. 2.2, 2.33, 2.35, 2.49) for components of PES-NWI (e.g. Staff Resource Adequacy, Nurse Manager Ability, Nurse Participation). Reflecting on these scores, having a neutral point in the Likert items of PES-NWI was considered especially as a neutral option allows greater flexibility to respondents. Another point to look at was, a higher number of scale points in Likert items given the diverse nature of nursing practice environment. We were mindful that these structural matters have impact upon the instrument’s reliability (Masters, 1974) and with careful consideration the following adaptation was incorporated at this stage:

- Designing the instrument with a number of scale points of one to seven in response items, where four represents a neutral position. Therefore, respondent’s flexibility in choosing their desired opinion was given preference over mathematical consideration that a neutral category option could reduce reliability of items (Masters, 1974). The higher number categories in response provides further benefits such as; more variability in response through spread of total score distribution, higher reliability through more precise responses and further flexibility through combining responses to lower numbers if required in future (Dawis, 1987, Masters, 1974). We planned to assess Australian nurses’ comfort in handling higher response options at later stages.

An adapted PES-NWI instrument was put together by taking 31 items of the original PES-NWI, 17 items of EOM (i.e. 12 from Cultural Values and 5 from Nurse Unit Manager’s Support) and the study then proceeded to the second step of adaptation process, the Peer Review.

1.2: Peer Review

The purpose of this stage was to discuss the adapted instrument’s content, structure and language with academic and practitioner who are experts in nursing research and the Australian nursing practice environment. The first peer reviewers to access were twelve nursing researchers from Nursing Research Circle of School of Nursing and Midwifery at University of Western Sydney. Some of these researchers are active peer reviewers, editors of reputed local and
international nursing journals. The initial discussion with reviewers took place in a regular research circle’s meeting where the overview of the research process was shared. Within a week from the meeting an electronic copy of the adapted instrument was mailed to them for feedback. The feedback was sought on the questionnaire’s suitability in the Australian context for content, language and structure. None of the peer reviewers received any reminders and eight (8) replies were received from this process.

Two nurse educators, one known to the authors and the other one recommended by Nursing Research Circle, were consulted to verify the adapted instrument’s suitability from a practitioner’s view. These educators are currently working at public hospitals, being well aware of practicalities and development requirements of Australian nursing practice environment. These were one to one interview sessions, one conducted face to face and the other one on phone.

Adaptations through Peer Review feedback:

- The reviewers found the content, language and structure of the adapted instrument suitable. Therefore, all the adaptations that were made to the instruments in this study were confirmed to be acceptable.
- One nurse educator found one item of PES-NWI (e.g. nursing unit manager backs up nursing staff in decision making, even if the conflict is with a doctor) mixes up doctor nurse conflict issue with nursing unit manager’s support. The item was changed to, “nursing unit manager backs up nursing staff in decision making” accordingly.
- Two nursing academics felt that the item (use of nursing diagnosis) is not relevant to the Australian nursing practice environment. With the assumption that this feedback should be confirmed with the practicing nurses at pilot study, it was not incorporated to adapt the instrument at this stage.

With the adapted instrument as mentioned above, the study moved on to the final step of research process, the Pilot Testing.

1.3: Pilot Testing
At this stage, ten practicing nurses recruited through snowball sampling were sent electronic copy of the adapted instrument for their opinion on its suitability to Australian registered nurses working at hospitals. Some guidelines (e.g. clarity of the language, relevance of the items to registered nurses, comfort with length of the instrument and 1 to 7 scale
points in response options of the instrument) were given to prompt them. These nurses matched the profile of the potential participants that is they were practicing registered nurses working at hospitals in New South Wales with a minimum of two years’ experience. They were informed that their responses are part of a pilot study and would serve the purpose of fine tuning the instrument. Seven replies were received from this process.

Summary of the adaptation as per Pilot Study:

- Two nurses did not find the item of PES-NWI (using nursing diagnosis) suitable to the Australian nursing practice environment. Besides that respondents confirmed their comfort to the instrument’s content, language and structure. The item (using nursing diagnosis) was finally dropped and the final version of the adapted instrument that carried 47 items now was ready for full-scale circulation.

The final instrument was circulated to 1,100 registered nurses in NSW through Nursing and Midwives Board (NMB), New South Wales as part of a PhD study. NMB randomly selected these nurses from the Board’s Register for Registered Nurses with screening criteria of minimum age of thirty. The age criterion ensured that participants have in-depth experience of Australian nursing practice environment. Sixty nine (69) replies were received from nurses in different hospitals in NSW. Two (2) responses had too many missing data; hence data of sixty seven (67) respondents were used for research analysis. The following section discusses the analyses conducted to comprehend the validity impacts of the adaptation process on the adapted PES-NWI instrument.

2. ANALYSIS OF THE ADAPTATION PROCESS and VALIDITY

The Standards for Educational and Psychological Tests classifies validity into three (3) types; content, construct and criterion validity. Despite this classification, different researchers have propagated different classifications of validity (Angoff, 1988, Shultz, Riggs & Kottke 1998) and the task of selecting one set of classification has become confusing. The authors’ intention is to discuss validity of the adapted PES-NWI coherently without getting lost in this confusion. The three types of validity that the adaptation process could relate to are; content, face and construct validity.
2.1 Content validity:
In simple terms, content validity is the adequacy with which a test samples the domains it claimed to cover (Fitzpatrick, 1983). Within this research context, the adapted PES-NWI instrument would have content validity if the material covered in this instrument is consistent with the established concepts of Australian nursing practice environment. The peer review process endorsed the adapted instrument with content validity as nursing researchers and nurse educators assessed the materials (e.g. items of cultural value, foundation of quality care) of the instrument to be consistent with that of Australian nursing practice environment.

2.2 Face Validity:
Face validity refers to the acceptance that the test has the common sense relationship, appearance of practicality and similarity to previous successful tests to meet the objective of the test (Mosier, 1947). Within this research context, the adapted PES-NWI instrument would be face valid if the instrument (i.e. instrument’s content, language, structure) appears to be sensible to Australian nurses and effective to the Australian nursing research experts. Nursing researchers in light of their expertise endorsed the adapted instrument to be effective as they found the mode of administration of the instrument, the structure of the instrument satisfactory to measure Australian nursing practice environment. The pilot study also verified that the potential respondents were comfortable with the content, scale level, the length of the instrument.

2.3 Construct Validity
Construct validity assesses whether the test is a good measure to identify concepts that are theory relevant but are not yet operationally defined (Angoff, 1988, Cronbach and Meehl, 1955). Within this research context, the adapted PES-NWI instrument could be justified to have construct validity if its results identified constructs that matched theoretical construct of nursing practice environment of previous research. Factorial analysis and internal consistency (i.e. Reliability scores) are acceptable ways to exhibit construct validity (Angoff, 1988, Hui-Ying Chiang and Lin, 2009).

Accordingly, confirmatory factor analysis (CFA) and reliability tests were applied in this paper to study the instrument’s factorial stance and internal consistency. The CFA analysis had the purpose to confirm that the items stayed into the constructs as hypothesized by Lake (2002) for nursing practice environment and Kramer & Schmalenberg (2003) for
“Cultural Values”. Regarding Nurse Unit Manager’s Ability domain, the hypothesized construct would be the ten items as combined in this paper from original PESNWI and EOM instruments. Such consistency would endorse construct validity of the adapted PES-NWI as items would fall into constructs that matches with the theoretical constructs of nursing practice environment of previous researchers. Factor analysis results were derived following principal axis factoring (PAF) method and further rotation technique was not required as items were forced into single factor. All the six components of Nursing Practice Environment (e.g. Nurse Manager’s Ability, Nurse Participation at hospital affairs, Doctor/Nurse Relationship, Staff/Resource Adequacy and Foundation of Quality Care and Cultural Value) had Kaiser-Meyer Olkin (KMO) measure of above 0.5 (Hair,Jr., Black, Babin & Anderson 2006) to attest for required sampling adequacy. The Table 1 depicts the final version of the adapted PES-NWI instrument and evidence of the instrument’s validity (i.e. factor loadings, reliability scores and KMOs).

The item composition of each component of the adapted PES-NWI was decided considering factor loadings and theoretical relevance of the items as authors intended to approach validity in practical and statistical sense. Except for the domain of “Foundation of Quality Care”, “Cultural Values” and “Nurse Manager Ability”, the items of all others loaded to single factors with factor loadings above 0.4 (Hair et al., 2006) to evidence items’ satisfactory representation to the hypothesized construct. In case of “Cultural Values” only one item (i.e. High performance & productivity are expected) had factor loadings below the cut-off point. Considering that this item is theoretically linked for establishing cultural value, we proposed to keep this item in this component. Similarly, in the case of Nurse Manager Ability” the item (i.e. Senior Nurses use mistakes as learning not criticism) having low factor loading value was kept for theoretical relevance. The “Foundation of Quality Care” had three items (i.e. written up to date patient plans, same nurse/patient one day to next, high standards of nursing care expected by hospital management) with factor loadings below the cut-off point. Due to resource shortage, assigning nurses to same patients can’t be practiced in reality. Hence Australian nurses could not relate to this item and accordingly we excluded this item from this component. The other two items were kept in this domain due to its theoretical relevance to quality of nursing care.
Therefore, the adapted PES-NWI instrument in its complete and valid form is proposed to have 46 items as shown in Table 1.

Table 1. Validity and Reliability of the adapted instrument

<table>
<thead>
<tr>
<th>Results</th>
<th>Adapted PES-NWI instrument: validity &amp; reliability of proposed six domains</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Doctor Nurse Relationship</td>
</tr>
<tr>
<td>No. of items</td>
<td>3</td>
</tr>
<tr>
<td>KMO</td>
<td>.754</td>
</tr>
<tr>
<td>Reliability</td>
<td>CSA**:.950</td>
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</tbody>
</table>

* Kaiser Myer Olkin Measure of Sampling Adequacy, ** Cronbach Standardized Alpha

All the constructs in the adapted instrument are internally consistent with high reliability scores (Hair et al., 2006) and these reliability scores are better than what have been reported by earlier Australian study (Joyce and Crookes, 2007). The satisfactory score of reliability and factor analysis of the adapted PES-NWI shows that a logical adaptation process is likely to draw meaningful and relevant research outcome.

3. CONCLUSION

This paper attempted to communicate adaptation process of a nursing practice environment measuring research instrument, PES-NWI in the Australian context and the topic of validity of the adapted PES-NWI. The discussion first explained the adaptation process in the area of content, language and structure and then went on to assess reliability and validity (e.g. construct, face and content) of the adapted instrument. The satisfactory
reliability and validity of the adapted PES-NWI is encouraging as it is believed that an adequate research process (i.e. having the right instrument) is likely to result in valid (i.e. meaningful and relevant) conclusions (Hammersley, 1987). This paper makes a case that researchers following a structured process for instrument adaptation would not put the instrument’s validity at stake. More discussion on the validity of the adapted PES-NWI is needed to facilitate better outcome in future research on Australian nursing practice environment.
Reference:


